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**SHOCK ABSORBER**

[緩衝器]

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(57) [Abstract]

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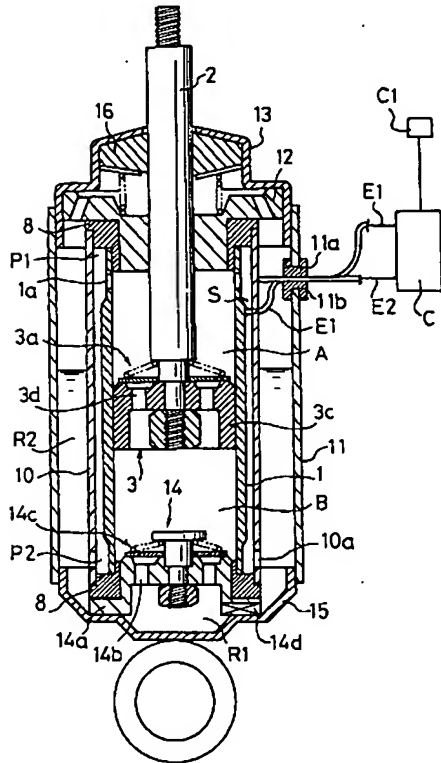
[Objective]

Electric shock and leakage current are prevented and in regard to management and in regard to maintenance it is advantageous and also, decay effect that can be realized according to setting, try to be able to expect improvement of general utility.

[Constitution]

Through extending side check valve 3a in piston part 3 connecting piston side chamber B to rod side chamber A, it forms gap S for control and which it connects with to cylinder 1 and rod side chamber and reservoir chamber R2 between inner tube 10 through pressure side check valve 14c also, reservoir chamber in base valve section 14 of arrangement in bottom end of cylinder being connected by piston side chamber, it becomes, Each both ends of

aforementioned cylinder and inner tube through the insulator 8, connecting to valve body of bearing and base valve, gap for this said control it opposes to each port which you connect with to rod side chamber and reservoir chamber inside gap S for control forming large pocket, at same time, We assume that inner tube it becomes as electrode component of other the cylinder it makes electrode component of one side vis-a-vis.



[Claim(s)]

[Claim 1]

Although it arranges inner tube in outside of cylinder, arranges the outer part tube in outside of inner tube, forms reservoir chamber between the inner tube and outer part tube and becomes, furthermore inside cylinder the taking in equipment does piston part in slidable and partition forms rod side chamber and piston side chamber inside said cylinder through extending side check valve in piston part connecting piston side chamber to rod side chamber, Forming gap for control which is connected with to cylinder and rod side chamber and reservoir chamber between inner tube either, through pressure side check valve also, reservoir chamber in base valve section of arrangement in bottom end of cylinder being connected by piston side chamber or, each both ends of aforementioned cylinder and inner tube through insulator, connecting to valve body of bearing and base valve, gap for this said control it opposes to each port which is connected with to rod side chamber and reservoir chamber inside gap for aforementioned control forming large pocket, at same time, shock absorber. which inner tube becomes as electrode component of other cylinder it makes electrode component of one side vis-a-vis and makes feature

[Description of the Invention]

[0001]

[Field of Industrial Application]

This invention, electroviscous fluid being applied voltage, regards shock absorber which makes adjustment of

occurrence damping force possible viscosity making use of property which changes.

[0002]

[Prior Art]

There being a hydraulic pressure shock absorber recently, as shock absorber which is utilized in the for example automobile, in order for occurrence damping force to be adjusted according to status of road surface of said automobile, configuration it is done, it is desired.

[0003]

And, there being a hydraulic pressure shock absorber which is proposed from until recently because of that, general, when by fact that piston rod is frequented vis-a-vis cylinder piston part rubbing doing inside cylinder, as the predetermined damping force occurs by fact that hydraulic oil passes damping force generating part, Modifying mechanism of damping force occurrence in said damping force generating part in for example mechanical, or increasing and decreasing flow of hydraulic oil which passes the said damping force generating part, in order high and low to be possible to adjust occurrence damping force, configuration it is done.

[0004]

As a result, when above-mentioned damping force generating part configuration it is done with those of attenuation of for example drawing and valve or other peculiar, hydraulic pressure shock absorber which is decided that damping force which occurs inside range of attenuation of the said peculiar is adjusted, therefore when, equips this damping force generating part is installed in automobile, Adjusts occurrence damping force, according to status of road surface where said automobile runs there is a fear which cannot achieve objective of start that to satisfactory and becomes.

[0005]

In order and, to be possible to show damping force of characteristic of the diverse, when damping force generating part configuration is done in structure which possesses many drawing and valve, etc., structure of said hydraulic pressure shock absorber becoming complicated, productivity decreases and/or or other undesirable where maintenance becomes difficult it is invited not only, Although structure becomes complicated, concord doing, control becomes complicated, such as means that expensive part is used that much doing, also or other undesirable where manufacturing cost is risen is likely to be invited.

[0006]

Then, recently, electroviscous fluid which possesses property where viscosity changes with applied voltage is discovered, discrimination/reference plan doing, shock absorber of electroviscous fluid utilization of kind of structure which it shows in for example Figure 2 is proposed.

[0007]

Namely, said shock absorber, being formed by embodiment of conventional hydraulic pressure shock absorber being something which becomes, as rubbing it does inside the above-mentioned cylinder 1, possessing piston part 3 which rod side chamber A and piston side chamber B partition is formed inside said cylinder 1, becomes in tip of piston rod 2 which frequenting unrestrictedly is inserted vis-a-vis cylinder 1.

[0008]

And, electroviscous fluid being filled in rod side chamber A, and piston side chamber B it becomes, said rod side chamber A and piston side chamber B, in piston part 3 extending side check valve 3a of arrangement through drawing 3b which parataxis is done in this, have assumed that it is connected.

[0009]

In addition, cylinder 1, in upper end we have respectively possessed port 1b in port 1a and bottom end, through said each port 1a, 1b, we have assumed that each side chamber A, B connects to outside respectively.

[0010]

Furthermore, reservoir tank T is arranged in outside of cylinder 1, inside tank housing T1 which forms said reservoir tank T there partition formation free piston T4 the taking in equipment has been done reservoir chamber T2 and gas chamber T3 in slidable.

[0011]

And, reservoir chamber T2, through pipe P, have assumed that it is connected to piston side chamber B inside cylinder 1.

[0012]

On one hand, in order to form reservoir chamber R in outer perimeter side of cylinder 1, generally known outer cylinder being arranged, we assume that it becomes, but said outer cylinder, head side cylinder 4 and bottom side cylinder 5 and the intermediate section cylinder 6 and, consists of.

[0013]

Furthermore reservoir chamber R communicates with each side chamber A and B via a port 1a and 1b of a gap to cylinder 1.

[0014]

Head side cylinder 4 becomes, attachment doing bearing member 7 in top end inner perimeter, in the central portion of said bearing member 7 piston rod 2 is inserted in slidable.

[0015]

We have assumed that and, said head side cylinder 4 becomes, possessing flange portion 4a in bottom end, through said flange portion 4a, is connected to top end of intermediate section cylinder 6.

[0016]

bottom side cylinder 5 becomes, in bottom end thick-walled portion pressure side check valve 5a possessing the drawing 5b which parataxis is done in this, said pressure side check valve 5a and drawing 5b have connected reservoir chamber T2 inside aforementioned reservoir tank T to piston side chamber B.

[0017]

We have assumed that and, said bottom side cylinder 5 becomes, possessing flange portion 5c in top end, through said flange portion 5c, is connected to bottom end of intermediate section cylinder 6.

[0018]

intermediate section cylinder 6 has had flange portion 6a, 6b respectively in top and bottom edges, said each flange portion 6a, 6b through insulator 8 to flange portion 4a of head side cylinder 4 where each one opposes and flange portion 5c of bottom side cylinder 5 respectively, is connected with the bolt nut 9.

[0019]

And, intermediate section cylinder 6, in order between outer perimeter of inner perimeter and the aforementioned cylinder 1, portion of aforementioned reservoir chamber R to make generally known width narrow, have assumed that gap S for control where, spacing becomes approximately 1 mm extent is formed.

[0020]

gap S for said control functions in order to change in the hardening tendency viscosity of electroviscous fluid which occasion where the electric field is revealed here lies between in said electric field according to the applied voltage quantity.

[0021]

And, there being this Prior Art Example, cylinder 1 intermediate section cylinder 6 makes electrode component of other it makes electrode component of one side vis-a-vis, is connected by top end cylinder 4 where electric cable E1 which is extended to outside from the controller C of arrangement is connected to electrical to electrode component, namely the cylinder 1 of one side, We have assumed that it is connected to intermediate section cylinder 6 where electric cable E2 which is extended from controller C makes electrode component of other.

[0022]

Therefore, when piston part 3 rubbing doing inside cylinder 1 by fact that piston rod 2 is frequented according to shock absorber of electroviscous fluid utilization as this former proposition, vis-a-vis cylinder 1, it means that electroviscous fluid passes gap S for control which is arranged in the outside of said cylinder 1, but This time imparting doing predetermined voltage in electrode component of both, if it tries to reveal electric field in gap S for control, with said electric field the viscosity of electroviscous fluid it means to change in hardening tendency according to applied voltage quantity.

[0023]

Therefore, above-mentioned applied voltage is maintained in the condition, later, it becomes tendency where it can obstruct permeability of electroviscous fluid in gap S for control as a result, can obstruct lubricity inside cylinder 1 of piston part 3, if namely, it is decided that decay effect is revealed and selects applied voltage quantity to electrode component of both appropriately, It means to be possible to adjust extent of decay effect which is revealed option.

[0024]

If shock absorber and, as above-mentioned former proposition is installed in automobile, for example riding comfort where adjusts extent of decay effect according to status of road surface of said automobile to become, in said automobile possible it means to be possible to improve in desirable state.

[0025]

[Problems to be Solved by the Invention]

But, there being a shock absorber of electroviscous fluid utilization as above-mentioned Prior Art Example; as there is a deficiency in regard to preservation, there is a fear which you cannot expect predetermined decay effect and becomes.

Namely, as for shock absorber which relates to Prior Art Example, with top end cylinder 4 and bottom side cylinder 5 which are connected to electrical to electrode component, namely on one hand electrode component barrel cylinder 1 of both there is a status where intermediate section cylinder 6 which makes electrode component of other is exposed in outer perimeter of shock absorber.

[0026]

Therefore, generally known field bleaching it does electrode component of the both and, there is a state, when

human body touches to this, there is a hazard of electric shock.

Being in installing state to also, automobile, current through the bearing member 7 etc, there is a hazard of leakage current with contact to other section, electric power loss occurs.

[0027]

And, in case of above-mentioned Prior Art Example, flange portion 4a, 6a and 5c, 6b because it is formed to form which protruding is done, is a undesirable which becomes above-mentioned electric shock and that opportunity of the leakage current increases in outside of shock absorber.

[0028]

Furthermore, spacing of gap S for control when fact that is considered, it is necessary for this to be kept in approximately 1 mm extent there being a Prior Art Example which was inscribed, must evade or other situation where unevenness is invited in intermediate section cylinder 6 no matter what. There is a fear where there is a hazard where said shock absorber stone collides to outer perimeter of intermediate section cylinder 6 while installing to for example automobile and such as doing can do recess, in case of or other which can do the said recess, it is decided that spacing of gap S for control deviates, cannot expect decay effect of according to setting and becomes.

[0029]

And, as for maintenance of spacing in gap S for control, when said shock absorber it conveys as product, by fact that it is requested, there is also a undesirable where management becomes difficult.

[0030]

Furthermore in order in order to increase also, control efficiency to be able to control even with low voltage, when gap S for control is made small, influx outflow possible effective surface decreases and voltage control generates unrelated drawing effect and there is also a disadvantage where damping force becomes unstable.

[0031]

As for this invention, before considering situation which was inscribed, being something which is originated, as for purpose, there is not a possibility of electric shock and leakage current, in regard to management and in regard to preservation it is profitable and also, predetermined decay effect that being possible to try is actualized according to setting, it is to offer shock absorber of electroviscous fluid utilization which can expect improvement of commodity.

[0032]

[Means to Solve the Problems]

In order to achieve objective which you inscribed, it arranges the inner tube in outside of cylinder of shock absorber of electroviscous fluid utilization which relates to this invention arranges outer part tube in outside of the inner tube, forms reservoir chamber between inner tube and outer part tube and becomes, Furthermore inside cylinder taking in equipment doing piston part in slidable, although partition it forms rod side chamber and piston side chamber inside said cylinder, through extending side check valve in piston part connecting piston side chamber to rod side chamber, forming gap for control, which it connects with to cylinder and rod side chamber and reservoir chamber between inner tube it becomes, Through pressure side check valve also, reservoir chamber in base valve section of arrangement in bottom end of cylinder being connected by piston side chamber, to become, each both ends of aforementioned cylinder and inner tube through insulator, connecting to valve body of bearing and base valve, gap for this said control it opposes to each port which is connected with to rod side chamber and reservoir chamber inside gap for aforementioned control forming large pocket, at same time, it is something which inner tube becomes as electrode component of other the cylinder it makes electrode component of one side vis-a-vis and makes feature.

[0033]



[Working Principle]

outer part tube becoming generally known cover, impact or other external force operates the outer perimeter of electrode component barrel inner tube of other which forms gap for control which is in generally known interior of shock absorber to come to point of being possible to obstruct beforehand, therefore, spacing of gap for control according to setting is maintained becomes possible.

[0034]

Furthermore because electrode component barrel cylinder and inner tube to be arranged inside outer part tube, at same time each electrode component being the insulator, because insulating it is done, electrode component in outside to stop being exposed, current through other member, to outside does not flow, electric shock and leakage current are prevented.

[0035]

Because fluid is not squeezed by pocket damping force does not become unstable.

[0036]

[Working Example(s)]

When this invention is explained in detail below, on basis of the Working Example which is illustrated, as for Working Example which is shown in the Figure 1 with shock absorber where this makes automotive, said shock absorber becomes, becomes, cylinder 1 and inner tube 10 and outer part tube 11 and, possessing, being formed by triple cylindrical for generally known double cylindrical.

[0037]

cylinder 1 becomes, being formed by generally known single tube structure, as frequenting it inserts piston rod 2 unrestrictedly in interior, in the interior in slidable partition were formed possessing rod side chamber A and piston side chamber B which with piston part 3 which taking in equipment is done.

[0038]

And, electroviscous fluid where viscosity changes at time of applying voltage has been filled in rod side chamber A and piston side chamber B.

[0039]

In addition, cylinder 1 becomes through insulator 8 to bearing member 12 where top end inserts piston rod 2 in central portion occlusion being done with the state which is connected, said bearing member 12, top end of inner tube 10 it is plugged distribution resident in under of insulator 8 have assumed that also.

[0040]

Furthermore bearing member 12, as seal member 16 is kept, is connected to bottom side inner perimeter of cap 13 which inserts piston rod 2.

[0041]

cap 13 has connected top end inner perimeter of outer part tube 11 to bottom side outer perimeter.

[0042]

And, cylinder 1 is done, bottom end base valve section 14, occlusion, namely, through insulator 8a to outer perimeter of valve body 14a which forms base valve section 14, occlusion it is done with state which is connected.

[0043]

And, this valve body 14a, bottom end of inner tube 10 it is plugged distribution resident in under of insulator 8 have assumed that also.

[0044]

Furthermore valve body 14a being supported with state which is connected to bottom material 15 which is arranged in lower, assume that it becomes, said bottom material 15 has connected bottom end inner perimeter of outer part tube 11 to top end outer perimeter.

[0045]

As for base valve section 14, possessing reservoir chamber R1 in inside, as it becomes, although opening top end of the port 14b and said port 14b in order to be plugged, through pressure side check valve 14c which is arranged in valve body 14a, it connects said reservoir chamber R1 to piston side chamber B, Reservoir chamber R1 through pore 14d which was formed to bottom end of valve body 14a, we have assumed that it connects to the outside, namely inner tube 10 and reservoir chamber R2 which is formed between outer part tube 11.

[0046]

piston part 3, opening top end of port 3d and said port 3d in order to be plugged, through extending side check valve 3a which is arranged in the piston body 3c, have assumed that piston side chamber B is connected to the rod side chamber A.

[0047]

On one hand, port 1a being \* opening in upper end of cylinder 1, through said port 1a, we have assumed that it connects to gap S for control which, is formed between inner tube 10 where rod side chamber A is arranged in outside of outside, namely cylinder 1 and said cylinder 1 of cylinder 1.

[0048]

We have assumed that spacing of gap S for said control, before in same way as case of Prior Art Example which was inscribed, is made approximately 1 mm extent, is this Working Example, before is set with adjustment of generally known thickness of insulator 8 which was inscribed.

[0049]

In bottom end of inner tube 10, port 10a being \* opening, through the said port 10a, it has made gap S for control and that reservoir chamber R2 connects.

[0050]

Now, gap S for control electroviscous fluid which circulates becomes the tendency which always flows into reservoir chamber R2.

[0051]

In this case, top and bottom parts outer perimeter of cylinder 1 is made thinner than shaft, opposes to port 1a, port 10a large pocket P1, P2 to be formed, it flows to the port 1a, 10a and it is designed in such a way that fluid which flows out is not squeezed.

[0052]

pocket P1, P2 may form inner perimeter of inner tube 10 notch being.

[0053]

pocket P1, P2 may be partial even with ring shape, cross-sectional area is larger than gap S for control, it is desirable.

[0054]

By way, electric field is revealed in gap S for control, in the electrode component of both of plus side and minus side with what predetermined voltage the imparting is done, being this Working Example, as cylinder 1 which makes on one hand electrode component is set to for example plus side, we have assumed that inner tube 10 which makes electrode component of other is set to minus side.

[0055]

And, electric cable E1 which is extended to cylinder 1 from controller C of the outside being connected, as it becomes, electric cable E2 which is extended to inner tube 10 from controller C being connected, we have assumed that it becomes.

[0056]

Furthermore penetrating insulator 11b where electric cable E1, E2 penetrates outer part tube 11 being, in said outer part tube 11 in hole 11 a for insertion of opening is inserted under liquid-tight state under liquid-tight state, we have assumed that it becomes.

[0057]

electric cable E1 while insulating you being done, penetrating inner tube 1, is connected to cylinder 1.

method of connection is not something which is limited in this.

[0058]

There being this Working Example, we have assumed, that signal from the height sensor C1 which is installed in automobile is inputted into the controller C, said shock absorber is installed by automobile and when it runs road surface, we have assumed that applied voltage quantity to electrode component of both is adjusted appropriately, according to status of said road surface.

[0059]

Therefore, like above regarding shock absorber of electroviscous fluid utilization which relates to this Working Example which was formed, piston rod 2 is frequented vis-a-vis cylinder 1 at time of extending and retracting operations of said shock absorber where, the electroviscous fluid which is rod side chamber A through gap S, reservoir chamber R2 and base valve section 14 for control, it means to flow into piston side chamber B.

[0060]

Namely, said shock absorber, that extending and retracting operations time, always, electroviscous fluid from rod side chamber A gap S for control comes to point of circulating, means to function as generally known one-way type.

[0061]

And, at time of pressure side operation of said shock absorber electroviscous fluid which becomes surplus in rod side

chamber A, through gap S for control, flows in reservoir chamber R2, at time of extending side operation of said shock absorber electroviscous fluid which becomes insufficient in the piston side chamber B, through base valve section 14, is added from reservoir chamber R2.

[0062]

When at time of extending and retracting operations of said shock absorber, predetermined voltage imparting is done in on one hand electrode component barrel cylinder 1 and electrode component barrel inner tube 10 of other, electric field is revealed in gap S for control which is formed between electrode component of both.

[0063]

Revelation of said electric field has lain between there, namely, there it is decided that viscosity of electroviscous fluid which has circulated in the hardening tendency changes in moment, therefore, as for electroviscous fluid where said viscosity changes, later, gap S for said control electroviscous fluid circulates operates tendency which is obstructed.

[0064]

As a result, coming to point of being able to obstruct discharge property of electroviscous fluid from rod side chamber A, to come to point of being able to obstruct lubricity inside cylinder 1 of piston part 3, this being revealed, as decay effect interference immersion characteristic to inside cylinder 1 of piston rod 2 and protruding characteristic from inside cylinder 1 of piston rod 2, said shock absorber it means to function as generally known shock absorber.

[0065]

Therefore, if applied voltage quantity is controlled appropriately, when the decay effect according to applied voltage quantity at once, furthermore predetermined damping force adjustment is executed smoothly without step to become possible, said shock absorber is installed in automobile, adjustment of decay effect which responds to status of road surface of said automobile becomes possible, for example riding comfort in said automobile it means to be possible to improve in the desirable state.

[0066]

[Effects of the Invention]

Like above, according to this invention there is following effect.

[0067]

When it makes shock absorber which by fact that 1 applied voltage quantity is controlled appropriately, furthermore executes predetermined decay effect at once smoothly to become, installs this in automobile possible the damping force adjustment which responds to status of road surface of said automobile becoming possible, it means that for example riding comfort of said automobile is improved satisfactorily.

[0068]

In order gap for 2 control for impact from outside not to operate directly, because it is formed to generally known interior of shock absorber, being possible to obstruct impact or other external force action to outer perimeter of electrode component which forms gap for control beforehand, according to setting it maintains spacing of gap for said control it becomes possible.

[0069]

electrode component of 3 both stops being exposed in outside, electric shock and leakage current are prevented.

[0070]

Because 4 cylinder and each end of inner tube are done insulating, through bearing or other member, even when current being direct current, not to flow to other member, leakage current can be prevented even with the alternating current can prevent electric power loss.

[0071]

Opposing to 5 port, because pocket is provided, fluid resistor in this portion is little, can prevent occurrence of unused damping force.

In addition distribution of fluid velocity in inlet, outlet of port becomes even, characteristic of electroviscous fluid stabilizes.

[Brief Explanation of the Drawing(s)]

[Figure 1]

It is a sectional view which shows shock absorber of electroviscous fluid utilization which relates to one Working Example of this invention.

[Figure 2]

As Prior Art Example it is a sectional view which shows shock absorber of electroviscous fluid utilization.

[Explanation of Symbols in Drawings]

1  
cylinder  
10  
inner tube  
11  
outer part tube  
14  
base valve section  
14c  
Pressure side check valve  
3  
piston part  
3a  
extending side check valve  
8  
insulator  
A  
rod side chamber  
B  
piston side chamber  
P1  
pocket  
P2  
pocket  
R2  
reservoir chamber  
S  
gap for control